

# SPINAL CORD AND REFLEX ACT

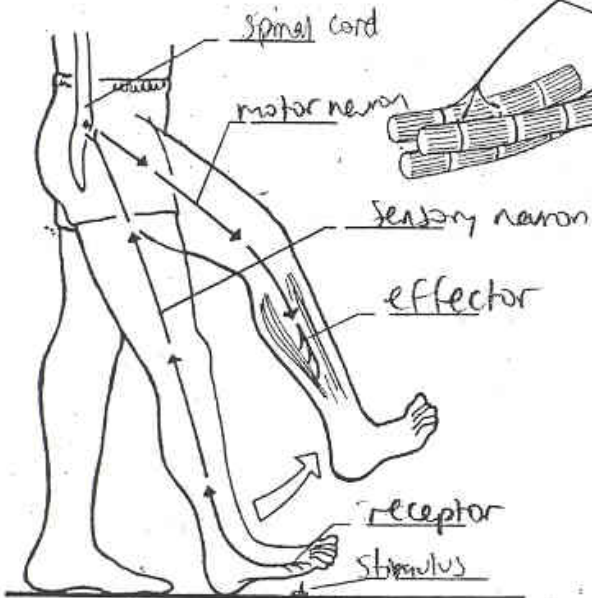
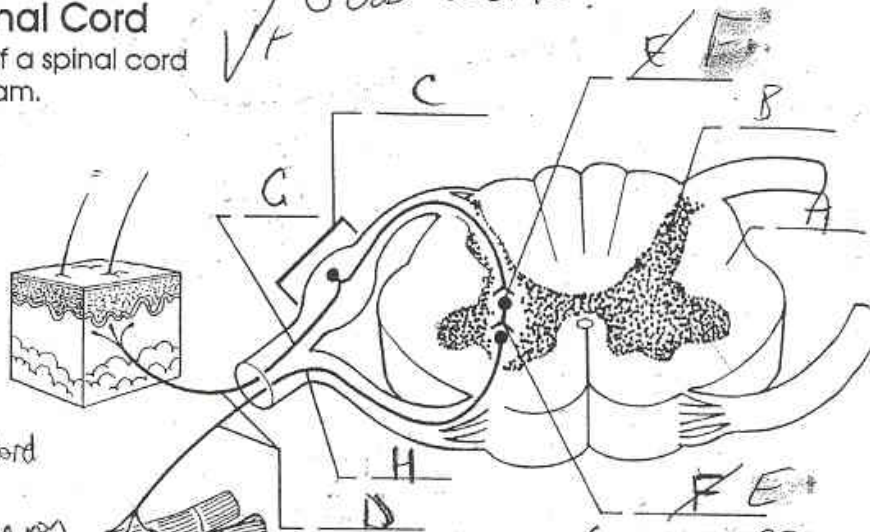
NAME \_\_\_\_\_

36

## Cross Section of Spinal Cord

Label the following parts of a spinal cord on the cross-section diagram.

- a. white matter
- b. grey matter
- c. dorsal root ganglion
- d. nerve fibers
- e. interneuron
- f. synapse
- g. sensory neuron
- h. motor neuron



## Reflex Act

Label the following parts of a reflex act on the diagram of a boy stepping on a tack and jerking his leg away.

- a. sensory neuron
- b. motor neuron
- c. stimulus
- d. spinal cord
- e. receptor (in skin)
- f. effector (muscle)

Fill in the blanks with the correct answers.

Suppose you stepped on a tack. You jerked your leg away because <sup>or before</sup> you were aware of what happened. The impulse traveled from the receptor, the skin, along a(an) sensory neuron into the spinal cord. The impulse jumped across a(an) interneuron to a(an) synapse; then across another synapse to a motor neuron. The impulse traveled along this nerve to a muscle, effector, in your leg. You jerked your leg away. Only a fraction of a second later, a(an) impulse traveled up your spinal cord to your brain. But you had involuntarily reacted. This kind of reaction is known as a(an) reflex. Reflex acts occur without thinking.

# I. Observing Nervous System Responses

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March 11, 2004

## II. Problem: Does gender affect reflex and reaction time?

We define reaction time as how many cm the thumb and the index finger are when the subject caught the meter stick.

## III. Materials: meter stick, reflex hammer, safety goggles, chair, table

## IV. Procedure (reflex):

- 1) Put on safety goggles.
- 2) Sit on a chair.
- 3) Ask the subject for permission to do the procedure and ask about any recent injuries.
- 4) Tell the subject to turn their face away, close their eyes, and relax.
- 5) Find the tendon under the knee with your thumb and gently tap your thumb with the reflex hammer. Watch closely for any slight reflexes.
- 6) Repeat step 5 four times and have the person or subject use the Jendrassik's maneuver if necessary.
- 7) Record data in a table.

## V. Procedure (action time):

- 1) Have subject elbow on a table and extend their arm over the table's side.
- 2) Have a group member hold the meter stick in the air, with the 0-cm line between the thumb and index finger of the subjects' extended hand.
- 3) Drop the meter stick without advance notice. Have the subject try to catch it between their thumb and index finger as quickly as possible.
- 4) Record data in cm's the position of the thumb and index finger.
- 5) Repeat steps 2 to 4 three times and record your data.
- 6) Average out the subjects' reaction time.
- 7) Record data.

## VI. Results: Reaction Time

Trials	Female (cm)	Male (cm)
1	19 (.20 sec)	10 (.14 sec)
2	9 ½ (.14 sec)	18 (.19 sec)
3	17 (.19 sec)	11 (.15 sec)
4	15 (.17 sec)	11 (.15 sec)
Average	15 cm (.17 sec)	13cm (.16 sec)

## Reflexes- Eyes

Stimulus Observations	What happened to the pupils
Light (male)	Pupils got smaller
Dark (male)	Pupils got larger
Light (female)	Pupils got smaller
Dark (female)	Pupils got larger

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**Reflexes- Knee Jerk**

Gender	Reflexes
Male	Leg slightly moved
Female	Leg slightly moved

**VII. Conclusion:**

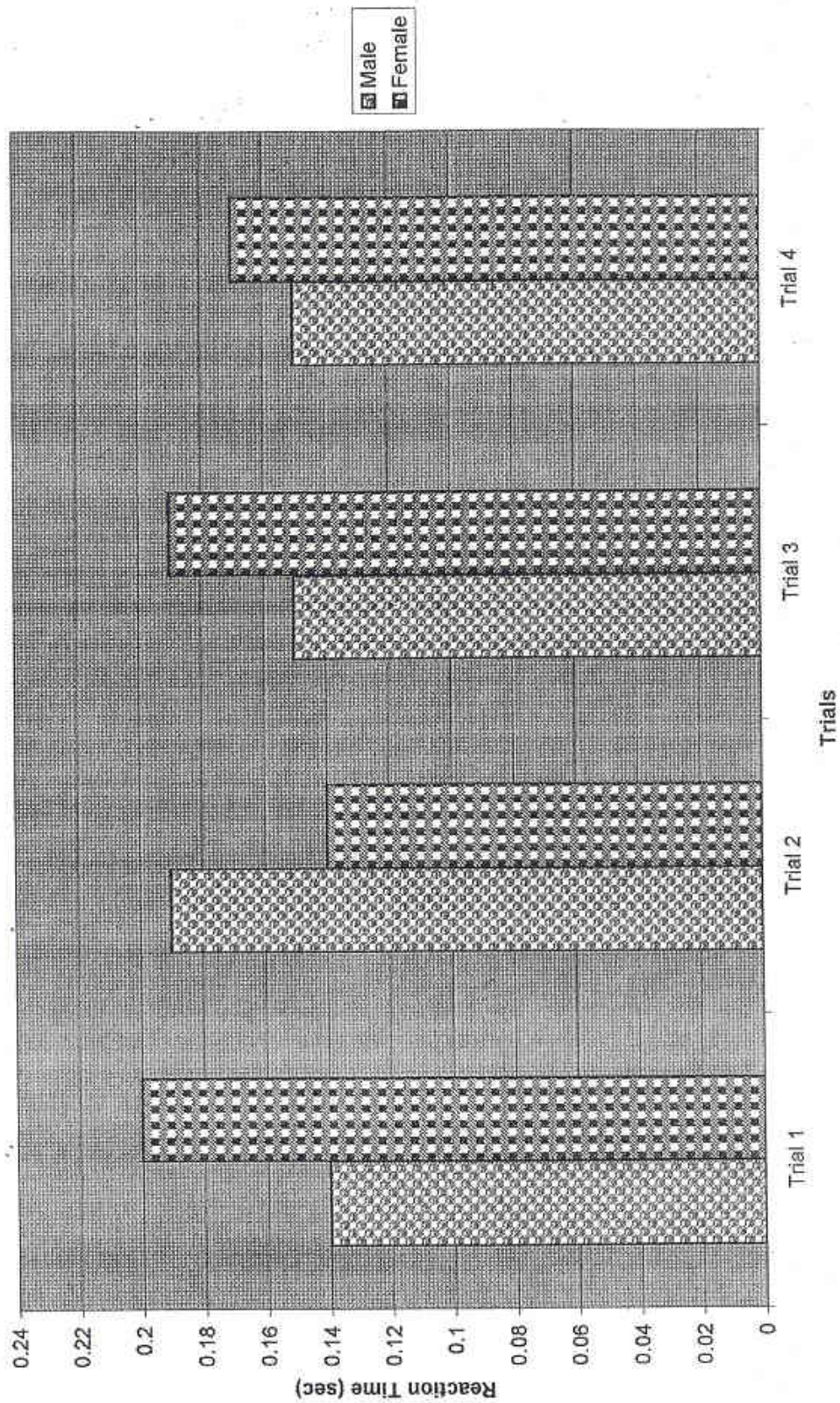
It turns out that males have slightly faster reflexes than females, but this data can't be depended on because we only tested one male and one female. We believe that if there were more test subjects the results would be more reliable. This experiment could be taken further by testing variables of various females vs. various males, male athletes vs. female athletes, and so forth.



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39

Reaction Times Male vs. Female



59/55

GOOD JOB!

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71

### Grading Rubric (55 points total)

Possible Points      your response required for maximum points

10	10 points	Lab report completed on time and neat. <u>Late labs lose ten points per day.</u> Lab due Monday March 15
5	5 points	Appropriate <u>Title</u> and <u>headings</u> (Parts I-VI) (all underlined) Include name and date.
10	10 points	Clearly stated <u>Problem</u> . What was the lab designed to test or measure? Does it consider both reflexes and reaction time?
10	10 points	Clearly written or outlined <u>procedure</u> and list of <u>materials</u> . Are both reflexes and reaction times tested?
5	5 points	Clear presentation of <u>results</u> , including <u>tables</u> , and a <u>graph to displaying reaction time</u> vs. your independent variable. Reaction time is calculated using $y=1/2gt^2$
6	10 points	Clearly stated conclusions about your data and how it relates the problem. <i>This would be developed</i>
5	5 points	<i>BETTER</i> Sharing experimental design and data with the class.
+5	As always if lab report is typed (Arial size 12) you will receive 5 bonus points.	
+3	If graph of reaction time vs. the independent variables is produced using Excel you will receive 3 bonus points.	

Calculating reaction time from raw data will be completed with Mr. Math section. Therefore you do not need to include it in your report.

in your



STUDENT #1

March 10, 2004

## Investigation on Stem Cell Research

It is estimated that the annual incidence of spinal cord injury (SCI), not including those who die at the scene of the accident, is approximately 40 cases per million population in the U.S. or approximately 11,000 new cases each year. Since there have not been any overall studies of SCI in the U.S. since the 1970's it is not known if incidence has changed in recent years.

The neurons that make up the spinal cord have extensions, called axons, that resemble telephone wires and carry messages between the brain and the rest of the body. Traumatic injury can kill neurons or interrupt the axon connections, causing a loss of function- resulting SCI.

Good description of what stem cells are

There has been a proposed solution in repairing spinal cord injury; stem cells. In stem cell research, the researchers used embryonic stem cells which have the potential to become any cell type in the body depending on what chemical signals they get when they mature. The researchers hoped that by triggering embryonic stem cells to become nerve cells precursors and then transplanting these precursor cells into the injured area they could promote healing of the spinal cord.

In this study researchers have used rats as test subjects. The researchers treated rats nine days after an injury to the spinal cord by transplanting cells from mice into the injury site. In an other control group, the rats underwent a fake operation and were given only the culture medium

with no cells. Two to five weeks following the procedure, the researchers found various markers that showed the transplanted cells were alive and functioning. They also used techniques to identify any axons that had grown from the transplanted cells. At two weeks, transplanted cells had not only filled the cavity at the point of injury, but had migrated up to 1 cm in each direction. By the five week follow-up, the cells were not as dense, but the injured regions still contained mouse axons. None of the cells had developed into tumors. Although, strategies including stem cell transplantation may some day be used to treat paralysis after spinal cord injury the biggest issue of all may be that human motor behavior is more complicated. Even if cells grow, it does not mean they will work. Also, in the real world, you often have to contend with blood, scarring, and <sup>good point</sup> other problems that were not mimicked in this model.

Among those who support embryonic stem cell research Christopher Reeves, paralyzed from the neck down, when he was thrown from his horse, is supporting a bill that would support therapeutic cloning. Celebrities have, also, been very much involved in the campaign for stem cell research in the U.S. including Michael J. Fox arguing on behalf of Parkinson's Disease research, and Mary Tyler Moore, making the case for diabetes research. As for those against stem cell research, the Bush administration caved in on the issue of embryonic stem cell research after the Catholic church expressed opposition to cloning.

Where did you find this  
What do you mean by "caved in"  
And what would he in response to a church group  
This should be typed

my.webmd.com/content/article...  
www.spinalcord.uab.edu